

MARCH
1953

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JOURNAL OF
THE WIRELESS
INSTITUTE OF
AUSTRALIA

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Published by the Wireless Institute of Australia,
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Melbourne, C.I.

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BEATRICE TOUZEAU,
96 Collins St., Melbourne, C.I.
Telephones: MU 4977, Cent. 3581.

PRINTERS:

"RICHMOND CHRONICLE,"
Shakespeare St., Richmond, E.I.
Telephone: JB 2419.

MSS. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Law Court Chambers, 191 Queen St., Melbourne, C.I., on or before the 8th of each month.

Subscription rate in Australia is 12/- per annum, in advance (post paid) and A15/- in all other countries.

Wireless Institute of Australia
(Victorian Division) Rooms' Phone
Number is FJ 6997.

WI BROADCASTS

All Amateurs are urged to keep these frequencies clear during, and for a period of 15 minutes after, the official Broadcasts.

VK3WI: Sundays, 1100 hours EST, 7146 Kc. and 2000 hours EST 50 and 144 Mc. No frequency checks available from VK3WI. Intrastrate working frequency, 7125 Kc.

VK3WI: Sundays, 1130 hours EST, simultaneously on 3573 and 7146 Kc. and re-broadcast on 50 and 144 Mc. Intrastrate working frequency 7125 Kc. Individual frequency checks of Amateur Stations given when VK3WI is on the air.

VK3WI: Sundays, 0900 hours EST, simultaneously on 7146 and 14342 Kc. 7065 Kc. channel is used from 0930 to 1030 hours each Sunday for the W.I.A. country hook-up. No frequency checks available.

VK3WI: Sundays, 1000 hours SAST, on 7146 Kc. Frequency checks are given by VK3DW by arrangements on the 7 and 14 Mc. bands.

VK3WI: Sundays, 0930 hours WAST, on 7146 Kc. No frequency checks available.

VK3WI: Sundays, at 1000 hours EST, on 7146 Kc. and 146.8 Mc. No frequency checks are available.

Television seems to have more ramifications than all the other problems of governing the people rolled into one. Its tempo fluctuates from week to week like the weather. First it's high on the news popularity scale with manufacturers and commercial interests seeking licenses and envisioning a rosy future for the electronic industry in general, then overnight the rosy future fades as with a mist in the first rays of the sun to leave the interested parties speculating on the future while a Royal Commission is called to investigate whether Australia can economically afford to run television, and if so, what changes can be expected to take place in the domestic life of the people.

Meanwhile, the Federal Government is proceeding with its original intention to bring about the amendment to the Broadcasting Act so that the Postmaster-General will have the power to grant licenses for television—probably both transmitting and receiving—as has been done over more than three decades with the amplitude modulated broadcasting services and other forms of transmission.

While these matters are enjoying the attention of responsible Ministers, the Institute has asked the Postmaster-General to provide for the licensed Amateur operator to participate in technical television transmission and reception experiments in the same way as Amateurs in other countries have been permitted.

No doubt once such approval has been given—and there is no reason either political or otherwise why such permission should be denied—the Amateur will run up against more problems than he can estimate in learning the "why" and "how" of this relatively new field.

Whether such license is granted or not the Amateur will have the really great problem of interference to the reception of commercial television transmissions—an interference far more "lethal" than the somewhat common b.c.i. problem of the ordinary broadcast services. Many people have willingly put up with a little interference from a nearby Amateur on their b.c. receiver, but the same people will not be prepared to see the picture on their screen go even the tiniest bit "squiffy" because of an Amateur. And there is no reason why he should!

The Institute has already placed emphasis on the problem of television interference—or t.v.i. as it is commonly known overseas—and is prepared to wholeheartedly support the statement that the Amateur will rise to this occasion and learn all there is to know about the problem as he has done with problems of a similar nature that have come and gone with the growth of radio from its early commencement.

Already the Institute has fostered wide interest in the t.v.i. proofing of ordinary Amateur transmitters so that to a large extent the interference problems insofar as Amateurs are concerned will be considerably less in proportion than was the case in other countries where Amateurs enjoy the privilege of conducting their hobby as we do in Australia.

Although problems beset every sphere of the television picture, they will eventually be overcome and television will take its rightful place in the scheme of things. The march of science is almost always retarded for one reason or another but seldom stopped. Problems are only milestones of learning.

FEDERAL EXECUTIVE

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Neutralising an R.F. Amplifier with the use of a Grid Dip Meter

BY A. H. VONTHETHOFF,† VK5KW

Neutralising of an r.f. amplifier can be achieved in a number of ways. One of the most common methods is by the grid dip indication of the grid current as the plate tank tuning condenser is rocked through resonance, and the neutralising condenser is advanced (increase capacity) until the grid dip in grid current is reduced to a minimum or non-existent. Most chaps are content to leave it at that. More by a fluke than good judgment is the stage correctly neutralised.

Furthermore, in an unneutralised stage, the dip in grid current that results as the plate tuning is rocked through resonance is because a portion of the power delivered to the grid circuit for drive purposes is transferred to the plate circuit via the grid-plate capacity of the tube. This power in the plate circuit at resonance can be measured comparatively by such indications as given by low current lamp, a neon or an r.f. meter, but all are clumsy and do not give a very good indication.

This is where a grid dip meter is most valuable. Most grid dip meters have three settings—off, filament on and B plus off (field strength), and oscillator on. For neutralising purposes, the second setting is the one we want.

If the meter is set for field strength indicating (i.e. set as an indicating wavemeter) it can be coupled to the plate tuning coil until a reasonable indication is obtained as the tuning is rocked through resonance. The neutralising condenser is then advanced and the reading of the meter is decreased. Naturally, drive is applied during these

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operations. A point will be reached as the neutralising condenser is advanced where there will be no indication on the meter as the tank is rocked through resonance, no matter how tightly the meter is coupled to the plate tank. For the most sensitive readings of the meter, it must be tuned to the frequency at which the neutralising process is carried out of course. I have found that this is the most practical, reliable and easiest method of correctly neutralising any tube from 3.5 to 50 Mc.

This method is also very good when used to neutralise a stage such as the p.p. neutralised triode r.f. amplifier described by VK5GL in his v.h.f. converter in the November issue of "A.R." It can be done in this manner. If the transmitter is already completed, a portion of its output can be loosely coupled to the grid coil of p.p. stage and a meter inserted via a resistor from the centre tap of the grid coil to read rectified grid current. With this drive applied a v.h.f. grid dip meter can be coupled to the plate circuit and as the plate tuning is rocked through resonance made to indicate as was the case with the low frequency set-up. The neutralising of the stage can then be carried out, and the indication of the meter reduced to zero when the stage is correctly neutralised.

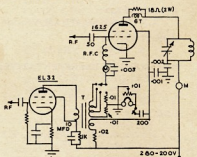
Do not be confused when I refer to the meter. I mean the grid dip meter. The meter that was inserted in the grid return of the tube was merely to indicate drive and to ensure that the grid dissipation was not exceeded. When drive has been determined it can be disregarded. All indications during the neutralising process were read off the grid dip meter.

falling off in quality, but the actual readability, especially under difficult conditions, increases immensely. Many DX reports confirm this.

The plate swing is also accentuated by the loading to the aerial, which, as in all screen systems, must be as tight as possible, and also by the grid drive, which should not be too great.

The grid current follows the trend of the plate and jumps on voice peaks, but on minimum grid injection remains practically steady. Incidentally, if distortion is encountered, experiment with that grid drive.

The dropping resistor shown in the h.t. to the EL32 modulator tube is only used to limit the voltage applied to 250 volts. If a 6V6 were used instead, it could be left out.



The 20,000 ohms in the screen of the 1625 could be altered to suit the individual tube. In my case, as my generator is over-loaded already, I keep the mills. down. That too, is the reason why, for local contacts, I keep the grid percentage of modulation at its lowest level. Does that pair of headphones intrigue you? It is my phone monitor, and quite effective it is too, and makes no difference to the modulation whatsoever. It could be used in the grid side quite as effectively I think, but for experimentation I wanted to listen with that winding switched right out.

I have not bothered to show the pre-amplifier stages in either the r.f. or audio sections for they are quite conventional. R.f. consists of an EF50 "Steco" and a 12SK7 buffer/doubler. The audio is a dynamic headphone as a mike to a 7C7 to a 6SH7.

The parasitic suppressor shown in the plate of the 1625 consists of six turns wound around the low value two watt resistor.

DUAL GRID MODULATION

BY R. J. WHYTE,* VK2AHM

It was on the 13th May, 1947, that the author had his first QSO using screen modulation—a Class B 1J6G with an audio transformer for modulation purposes, working the old 807 with 20 watts input; QRO with a vengeance for him. ZS6CZ was on the other end and when he could not copy the plate modulated four watts, the author was sold this screen idea and has used it ever since, sticking to the modulation transformer method.

The accompanying circuit is the best of very many ideas that have been tried and arose from VK3GZ remarking over the air that he had seen in "QST" an article by John Rienartz in which by modulating the control grid, along with the screen, much better speech quality and scope patterns were obtained.

* Willow Point Station, Wentworth, N.S.W.

I did not enquire how John R. did it, but as I was using a three-winding modulation transformer from a TR1133 in my rig at the time, I reckoned I could give it a go. Had it on the air within half an hour with slight alterations, such as the switch to use any of the tappings in the winding to the grid. It has been in use ever since (eight months).

It is quite different from the W scheme which I have seen.

Speech quality and depth of modulation were improved truly, but there was a third benefit which has meant a lot to me.

When the ratio of grid/screen modulation is increased in favour of the grid, i.e. the tapping is altered by the switch, there is quite a worthwhile amount of increase in the carrier on voice peaks. In my case, plate current will rise from 70 to over 120 Ma. on peaks. In this position there is some

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TANK CIRCUITS Q's

We have mentioned several times something about tank circuit Q's, which possibly might have left some of our readers wondering what significance it all has in the design and operation of radio gear. The fact is that operating Q's have a very profound effect on the performance of most of the equipment we have, so a little working knowledge of the subject might serve as a useful guide in the selection of components and operating conditions in equipment we Hams use every day.

Do not blame us if you are moved to check into some of your gear after reading this discussion and make changes which improve the operation (more output, cooler tubes, and the like) of equipment at your station.

The term "Q" is applied to the ratio of reactive power (wattless power) in a circuit to real power. From this basic definition of Q follows many interesting corollary relations in electrical circuits, although the concept is not in the least limited to the field of electricity. Immediately one can say that the Q of resistance is zero, and that the Q of a perfect coil or condenser is infinite. These are the absolute limits of Q's, but they are broad enough to provide plenty of room for error—or design, whichever way you may look at it.

What can a person do about Q if he buys a coil that has a Q of 250, and the designer of a circuit says such and so circuit should have a Q of 25? Are the manufacturers kidding; are they soaking

us for a lot of Q we do not need; or does the designer of the circuit think that any old coil will do if it will fit into the coil socket? No, the manufacturer is talking about his **product** when he says its Q is 250; the designer is talking about his **circuit** which generally involves more than the coil alone, and he should know enough about it to pick components which are the right ones for the job.

One of the fundamental properties of a coil of wire is its inductance. Disregarding distributed capacity (which can become a headache sometimes), the reactance of a coil is proportional to the product of its inductance and the frequency at which it is operated. Pure reactances are nice to talk about, but coils are not actually 100 per cent. pure reactances by the time you buy or make one—the wire has resistance! This resistance is generally distributed throughout the coil, as is the reactance, but let us think of it as being all drained down to the bottom of the coil in one chunk of pure resistance, leaving pure reactance at the top. If the reactance portion of this series circuit of pure reactance and pure resistance has a value of 250 ohms, and the resistance is one ohm, the Q of the coil is 250; or, concisely,

$$Q \text{ coil} = \frac{\text{Reactance (X)}}{\text{Resistance (R)}} = \frac{250}{1} = 250.$$

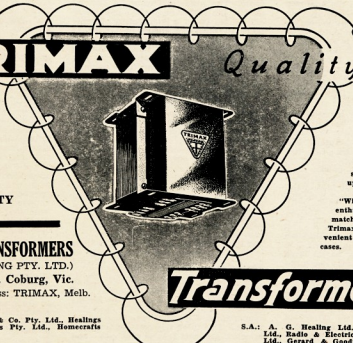
This is consistent with the basic definition given earlier. What we have

said about coils is equally true of capacitors, but it turns out that condensers can be made with much higher Q's than coils generally have, so we worry about coils a little more than capacitors when speaking about Q's of the circuit elements we use.

Well, if we apply 1,000 volts R.M.S. to this coil having a reactance of 250 ohms and a resistance of one ohm (the impedance is very, very nearly 250 ohms, not 251 ohms), 4 amperes of current will flow through both reactance and resistance, and the real power in the coils is 16 watts (which shows up as heat) and the reactive power is 4,000 volt-amperes, so called to distinguish wattless power from real power. The heat generated in this transaction represents energy lost—or at least energy converted from electrical form (that can be used conveniently) into heat that warms the coil and does not ever show up as energy in the antenna.

What of it? Why worry about 16 watts lost when we have 4,000 volt-amperes reactive power in the coil? If volt-amperes were what we were after, this would be fine. Think of it—4,000 volt-amperes that cost only 16 watts! A good bargain? Not bad if we know our P's (powers) and Q's, but that is the rest of the story. The circuit designer can now take over where the coil builder left off.

We all know, a capacitor in parallel with a coil makes a tuned circuit. It turns out that at the resonant frequency of this circuit the reactance of the capacitor is equal to the reactance



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of the coil. If we tune our coil with a capacitor having a Q of 5,000 (not unusual) we can truly neglect the 8/10 of a watt lost in the equivalent resistance of the capacitor compared with the 4,000 volt-amperes of reactive power (not lost—yet) in the coil and capacitor, and the 16 watts loss in the coil.

Now let us add a fourth circuit element to the reactance and resistance of the coil and the reactance of the capacitor comprising the tuned (tank) circuit we are talking about. Let us make this one a resistance, and let us put it across the condenser of the tank circuit. If 1,000 volts is still supplied across the coil, it now appears across the resistance and the capacitor as well. A little over 16 watts has already been accounted for in the coil and condenser so what about the new resistor? Well, a current of E/R flows in it, and power is consumed in the resistance—no doubt about it. It is already pretty hot!

How much power goes into this resistor? That is an easy one. The power is—

$$P \text{ (watts)} = E^2/R = \frac{1,000,000}{R \text{ (Ohms)}}$$

since the voltage E is 1,000 volts, R.M.S., by hypothesis. If R is 5,000 ohms, the power is 200 watts and the circuit Q is now—

$$Q \text{ (circuit)} = \frac{\text{Reactive Power}}{\text{Real Power}} = \frac{4,000}{216}$$

= 18.5 according to our basic definition of Q stated at the outset.

Let us not be quite so crude about it. Suppose the equivalent of this resistance is put across the capacitor by coupling a load to the coil and adjusting the coupling until the power delivered to the load is 200 watts. If the coupling job did not disturb the tuning, the circuit Q is still 18.5, and the generator feeding this circuit is unable to detect the difference. It still has to supply 216 real watts as before and 4,000 volt-amperes to the coil and the capacitor of the tank circuit. In fact, the generator does not even feel the 4,000 V.A. in the coil because the 4,000 V.A. in the capacitor happens to cancel the reactive power of the coil!

That is co-operation on a pretty big scale, but nobody should be surprised about it—this is what happens at resonance. Has the bargain evaporated? Not entirely, although the 4,000 V.A. has slipped through our fingers somehow. Proof? That was wasteful power, anyway. We did get 200 watts of good output from our circuit that loaded the generator to 216 watts, so the circuit efficiency is

$$\frac{200}{216} \times 100 = 92.6\%$$

a pretty fair bargain at that. Had we loaded the circuit to extract only 100 watts, the circuit efficiency would have been 100/116 \times 100 = 86.3%, not quite so good. The circuit Q in this case would have been 34.5. If the circuit were not loaded at all, the circuit efficiency would have been zero, with a Q of almost 250, about the same as that of the coil. Loading the circuit so that 400 watts is delivered would give a circuit efficiency of $100 \times 400/416 = 96.2\%$ with a circuit Q of 9.62. Which loading would you choose? To answer that we must consider the characteristics of the generator and the signal it generates.

If the generator had sinusoidal waveform (no harmonics) the tank circuit efficiency would be very close to 100% at any power level. But the generators we are interested in are vacuum tubes running as class B or C amplifiers, generally. A class B amplifier delivers a signal that is only half of a sine wave, and a class C amplifier does even less. The tank circuit helps the tube, which delivers only half of a sine wave (or less), to deliver a whole sine wave to the load. The degree to which this is done is almost directly proportional to the operating Q of the circuit. Thus, the tank circuit serves as a much needed coupling device between the tube and the load, and by various adjustments of coupling, we can make a fixed value of load resistance present a chosen value of load into which the tube (generator) actually delivers power.

A little power loss in the tank circuit is justifiable, since we have limited control over the actual load resistance and the tube characteristics; i.e., the optimum load for the tube itself. We have seen that the power output of the generator depends on the load resistance presented to it, in this case across the capacitor of the tank circuit. For a given tube and mode of operation (class A, AB, B or C) there is a definite best loading. Too light a load will not allow a reasonable output power; too heavy a load, on the other hand, wastes power in the tube (generator) and makes it overheat. All of these factors indicate a compromise, with the circuit designer as referee. It has been found that circuit Q's of about 10 or more make the tube happy—accept power for half a cycle or less and deliver power for a whole cycle. The numerical example showed us that the higher circuit Q's had lower efficiencies (with a fixed coil Q) so this tends to push the choice of circuit Q down.

The response of a tuned circuit to harmonics is approximately $1/nQ$, where n is the order of the harmonic (2 for second, 3 for third, etc.), so this consideration makes a choice of high Q desirable. A good all round choice of operating Q is from 12 to 15, a compromise to be sure. Now we do some juggling. We want to present the optimum load to the tube, but we must keep it happy. We also want to have good discrimination against harmonics present in the output of the tube. In addition, we want to waste as little of the tube's output power as possible; that is, we want good over-all efficiency.

Having chosen the operating voltage for the tube, the optimum resonant load resistance is fixed. Taking this and a value of circuit Q around 12 to 15, we can solve for the reactance of the coil and the condenser by substituting values in the following equation:

$$\text{Reactance} = \frac{\text{Load Resistance desired}}{Q \text{ (circuit)}}$$

This is the value that must be used to obtain the desired output power at good tube efficiency, at reasonable circuit efficiency, and with reasonable harmonic attenuation. Circuit Q affects all these things. The Q of the coil alone determines the power loss in the coil, once its reactance is established. Doubling the Q of the coil alone will cut the power loss in the coil itself to half—a desirable move for the sake of the coil—but this is not so easy, and the circuit

efficiency will be raised only a little bit (from 96%, say, to 98%, a little difficult to detect on the scale of the output power). Doubling the coil Q will not affect in the least the loss occurring in the tube itself. That loss is determined by the load into which the tube works, and by the mode of operation; i.e., class A, B or C.

It takes no magician to apply the foregoing information intelligently. In a typical amplifier, for example, the output circuit Q was chosen at about 15 (This will vary somewhat throughout a given band because of tuning.) The choice of 1,500 volts (the highest allowed by the tube manufacturer) was made to get the greatest useable output power and this sets the value of load resistance and coil reactance at any operating frequency. The numbers used in the foregoing numerical examples are quite close to those actually appearing in the amplifier. That is all there was to it. Easy? You betchaw!

One more comment. If a Q of 12 or 15 is so good for the output circuit, why was a Q of 25 chosen for the input (grid circuit) of the amplifier? Two main considerations guided this choice. The input load of a GL811-A depends somewhat on the loading in the output circuit. In order to have some latitude for error, the Q of the input circuit was made higher than actually necessary so that things would be on the safe side. The other consideration was this: the exciter, when coupled to the amplifier grid circuit, lowers the grid circuit Q. Thus, it is quite probable that the working Q of the grid tank circuit will be around 15, after all. Watch your P's and Q's. Keep your tubes happy, get more power out of your rig, lower the harmonic output, and save money in the choice of suitable components.

—Ham News, Sept.-Oct., 1952.

BOOK REVIEW

"TELEVISION"

By F. Nerkhof and W. Werner

Published by the Philips Technical Library, Eindhoven, Holland.

With the likely advent of television to Australian audiences in the near future, this book of 440 pages on television is very welcome. Written primarily for the design engineer and technician, it also covers the subjects adequately for maintenance technicians who will be servicing the television receivers. It assumes a sound basic knowledge of radio theory, and starts from that point.

All aspects of television are covered, both transmitting and receiving sides.

Chapter 1 is devoted to a review of the basic principles of television. Following this, Chapter 2 is taken up with the principles of electronic scanning, electron-optics, etc. Pick up and picture tubes are dealt with in Chapter 3, whilst Chapter 4 analyzes the television signal. In Chapter 5, under the heading "The excitation and application of electrical relaxation phenomena," we have information on pulse generators (which gives data on multivibrators, transistors, pulse mixing, frequency dividers and saw tooth generators).

Chapter 6 is devoted to time base generators and Chapter 7 to generation (Continued on Page 6)

Hidden Xmitter Hunting—Whys and Wherefores

THE SHIELDED LOOP

BY ED. MANIFOLD,* VK3EM

So you intend to take part in a Hidden Transmitter Hunt? This is a usual remark when it happens to be discussed among the Ham fraternity. We have, as a family, taken part in quite a few and no member of the family gets more thrills from the running down of the transmitter than the XYL who, incidentally, did not view Ham Radio with much favour for many years, but try and keep her out of a hunt now, no Sir, not for me.

THE LOOP

The loop is the most important piece of the equipment used in a hunt, for if this does not do the job intended for it, you may just as well stay home. Minimum requirements are a uniform figure eight polar pattern. This can be obtained with careful construction, and care in coupling to the receiver for any pick-up on the leads from the loop to the receiver will upset the polar pattern of the loop.

The loop I use is one which has given an excellent result over the years and is a shielded type, although an open type loop will, with careful construction, give equal results.

The shielding consists of two pieces of $\frac{3}{4}$ " diameter by 20 gauge copper tube bent in two half circles. This is best done by annealing the piece of tube and bending into a full circle, then cutting after the bending is completed. It is necessary that the copper tube loop has

With the W.I.A. Victorian Division's Hidden Transmitter Hunt coming up, we asked a few of the Hams who have done well in club competitions to describe their methods and the gear used. So how about joining in the fun—now where DID I put that $\frac{3}{4}$ " diameter copper tube?

an insulated joint at its top centre, and at the base, a copper or brass junction box for the tube to be soldered into each side of the box. This gives a construction as per Fig. 1.

The loop and box are constructed on a rotating support standard and attached to the car. The electrical details are not very complicated, but it may tax your patience threading the wire through the copper tube.

This is why it was made of $\frac{3}{4}$ " diam. when I would have liked all the turns. There are eight turns in the tuned loop, for 3.5 Mc., tuned with a 85 pF. midget variable condenser. A word of warning here about this condenser! Since it is going to get a lot of vibration and jolting, the bearings must be tight, or have a locking device to keep it in place once set.

The tuned loop is centre tapped and this tap earthed inside the copper junction box. This is best done by taking the length of wire (Nylax), doubling in one big loop, to get the centre of the wire, baring and soldering this point on to an earth lug inside the junction box, then threading the wire through the tubing from both sides alternately, turn for turn, using a piece of looped bare 20 gauge wire to pull each end through and when completed, solder each end to the rotor and stator connections of your condenser.

When this loop is completed a further three turns (or less, if you have a very low impedance input to your receiver) is wound round the tuned loop, as a pick-up loop to connect to the co-axial cable to the receiver (Fig. 2).

The receiver in use with this loop has capacitive coupling to the antenna (a BC454 Command Receiver), this necessitated a coupling coil being made to couple the pick-up loop to the receiver as the pick-up loop was made for low impedance input. This coil is housed in a small can and slug tuned or peaked on the operating frequency.

An added refinement was also included in the form of "Sense," but as this seems to be the matter of individual experiment to get going, it was thought better not to include details at this stage.

If you anticipate constructing an open loop which is much easier to make but not much good in wet weather, be sure that you keep your loop turns well together, otherwise when you get close to the transmitter, you will have no null points to guide your way in for the final locating.

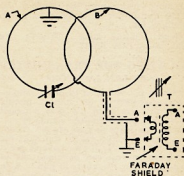


Fig. 2.

Loop A—8 turns, centre tapped, Nylax hook-up wire.

Loop B—2 or 3 turns Nylax wire.

C1—85 pF. variable, insulated from earth.

T—BC454, etc.

Note—The earth point of Loop A should be connected to earth at the box.

POINTS TO WATCH

● Always tune up and road test your equipment before the day of the hunt, as there is nothing more exasperating to be put out of the running by some trivial fault, and suppress the ignition of the car.

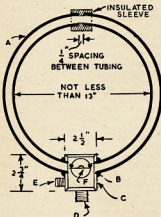
● Check the frequency of operation on your receiver dial and mark it for future reference. The reason being that you may not hear the transmitter from some locations and you will shift the dial looking for him. By changing your location, you want that reference calibration point frequently.

● Use the b.f.o. on your receiver for d.f. bearing, many a good Ham and his team have gone astray on that point. Generally now, c.w. is used for identification of the transmitter, but was not always so.

● When the signal has been identified and a bearing taken it is necessary to get what is termed a "fix," or to determine which way the transmitter is located. With "Sense," this is done on the first bearing, but with a plain loop, two bearings must be taken to determine which way the transmitter is located. This means a bearing must be taken from a second point to "fix" the transmitter's location. This can be marked on a map if desired and frequent bearings will confirm this "fix."

Once having determined the direction of the transmitter, the game is really on, as you will get reflected signals and many queer effects, particularly down a street, or two storied shops, etc., the signals come from everywhere.

● When getting close to the transmitter, the signal strength rises to many "db over nine," the loop will have an extremely broad "nose," and practically no noticeable "null" or minimum. The receiver sensitivity must be reduced to as low as can be heard, and the loop



SECTION

Fig. 1.

A— $\frac{3}{4}$ " diam. 20 gauge copper tube.

B—Flange and solder to side (don't braze).

C—18 gauge brass or copper box to house connections and tuning condenser.

D—Grub screwed or screwed flange to attach to rotating standard support.

E—Co-axial connector.

F—Condenser.

* 267 Jasper Road, McKinnon, S.E.14, Victoria.

rotated very slowly to hear the slight drop in signal strength on null points of the loop.

● When you get in that close, you can start turning over the stones to see if the transmitter is underneath, or up a hollow log.

Good hunting gang. "When's the next transmitter hunt?"

LOCATING THE TRANSMITTER

BY-LEN JACKSON*

This is not intended to be a comprehensive treatise on the subject, merely a few pointers from my own personal experience on transmitter hunts.

The main items of gear are a receiver, a loop aerial, and a car to transport the gear and yourself. If you haven't got a car, perhaps you can persuade one of your friends or neighbors to join in with you for the occasion; you provide the gear, they provide the transport.

Almost any receiver of reasonable sensitivity will do, provided of course that arrangements can be made to power it from the car battery. I have used a Type 3 receiver quite successfully, in fact I won a few hunts using this receiver. At present I am using a Bendix RA10FA, modified only by the removal of the remote control gear, front panel controls being substituted, and the re-wiring of the filaments for 12 volts. H.T. is supplied from an 18 volt I.F.F. generator, run off 12 volts.

My loop aerial is of the unshielded variety, and took only a couple of hours to make. The frame consists of two long pieces of fibre strip; the sort of stuff that terminal strips are made of. These are bent round to form a circle about 13" diam., and the ends bolted together with $\frac{1}{4}$ " bolts. The strips are $\frac{1}{4}$ " wide, each strip forming half the circle. The loop itself consists of six turns of single strand plastic covered wire, with a two-turn coupling link interwound between the centre turns. Across the ends of the loop a 75 pF. midgelet condenser is connected for tuning. This is isolated from earth, and is the only thing connected directly to the loop. The ends of the coupling link connect to a length of small diam. co-ax. which in turn connects to the aerial and earth terminals of the receiver.

The loop is mounted on a length of tank whip, which is passed through a small hole in the top of the cowl of

* 8 Austin Street, Bentleigh, S.E.14, Victoria.

the car (previously used for a cowl mount car radio aerial) and fits in a socket underneath, which allows the loop to be rotated from inside the car. This is by no means essential. I have seen several arrangements for strapping the supporting mast to a door pillar or the edge of a door frame, so that the whole thing is outside, and no damage is done to the bodywork, but in my case the hole in the cowl was already there and proved very convenient.

If a metal mast is used it is most essential to have the base of it well earthed to the body of the car. It is not necessary to use a circular frame for the loop, a square frame or any other shape may be used, and providing the overall dimensions are similar, the same number of turns will do. The loop is tuned to resonance by picking up a signal on the receiver, turning the loop edge on to the station, and tuning for maximum signal.

Well, assuming you have got the gear all rigged up and working satisfactorily, nothing now remains but to find the transmitter. While fixed d.f. stations, or even aircraft, can locate a transmitter quite accurately by taking only two bearings, under Ham conditions this is virtually impossible due to the pattern of the loop being upset by the proximity of the car body and reflections from nearby objects, such as power lines, etc., so here is how I go about it.

Having tuned in the hidden station, I rotate the loop for minimum signal. The loop is then broadside on to the station. A compass may be used for taking bearings, but I have never used one. I note the angle which the loop is making to the road I am in, whose direction is usually known, and this is quite sufficiently accurate, and much quicker. Having taken one bearing on the station, I travel some distance at right angles to this, and take a second bearing. Since the loop is bi-directional, this is necessary to find in which direction the transmitter actually lies, the point where the two bearings cross being the location.

Now the fun is really starting. The idea is to get there ahead of the other fellow, so no time must be lost. (But keep an eye on that speedo, you never know who's behind!) Since the approximate distance of the transmitter is usually known, a main street or road is selected which runs to the area where the transmitter is thought to be. Travel along this, taking bearings at intervals

to make sure you are still on the right track (if one drives the car while another operates the gear, this can be done almost continuously while the car is travelling).

When a point is reached where the bearing is almost at right angles to the road, a likely looking turn off should be watched for and taken. It's practically just a case of follow your nose. By this time signals should be getting very strong and excitement is mounting (Watch that speedo!)

Keep turning down the r.f. gain on the receiver, otherwise a sharp dip will not be obtained as the loop is rotated. Keep following the direction indicated by the loop and as the transmitter is approached, signal strength will keep building up until, in the vicinity of the transmitter, an enormous level is reached. The signal strength is a good guide to the distance still to be travelled.

When one is convinced that the transmitter is only a few yards away, then get out of the car and start looking; one has to find the actual transmitter, and not just the aerial or the operators, quite a different matter sometimes; for instance on a night hunt with the transmitter hidden in a clump of bushes!

By the way, if during the hunt one sees another competitor, don't take any notice of him, he's probably going the wrong way anyway. So good hunting chaps, and here's hoping these jottings may be of some help to you. (And watch that speedo!)

BOOK REVIEW

(Continued from Page 4)

of the extra high tension for the picture tube.

The treatment in Chapter 8 on wide band amplifiers gives a very full discussion of the requirements of video amplifiers, their response characteristics, and full design data on obtaining the wide bandwidths necessary.

From there we cover transmission lines or feeders and the aerials in Chapter 9.

The final chapters deal with "picture synthesis," including projection screen systems and then colour television.

From the above necessarily brief description it can be seen that this book will be a very necessary handbook on television design and maintenance when this modern science finally comes to Australia.

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Victorian Division's Hidden Transmitter Hunt

It has been decided to hold a Hidden Transmitter Hunt on **Sunday, 22nd March, 1953**. A few details are here-under set out for any member who is interested in taking part in this function.

- The assembly point will be the Flag-staff Gardens, at the corner of Williams and Franklin Streets (near the Victoria Market). A sign will be erected to show members the assembly point.
- Time of assembly will be from 1.15 p.m. onwards.
- The signal will come on the air at 2 p.m. sharp and will continue until 4 p.m.
- Transmission will be on phone and c.w. The c.w. will be automatic, thus: A long dash (of six seconds duration) of VK3APC, then a long dash, and so on, the speed approx. 8 words per min. The idea behind the c.w. is that the signal is more easily identified.
- The frequency to be used is 3516 Kc. in the 80 metre band.
- All members who assemble at the point will be issued with a sealed

envelope containing the location of the Transmitter. If any member does not want to take part in the hunt, he can proceed to the location but he must not leave for half an hour after the last competitor has left.

- Free Bail, VK3YS, will be at the starting point to give further details and distribute the sealed envelopes.
- It is suggested that members take a thermos, or refreshments of some sort, and make an afternoon of it, with the family.
- The Transmitter will be located approx. 15-20 miles from the G.P.O. (road).
- No competitor to switch on their receivers until the word is given to go.
- It is requested that all cars taking part, and others that will be going to the location, to put their **QSL Card** in the windscreen of their car.

Let's make this day a big one. You will enjoy the thrill of the hunt. If the weather is doubtful, please listen to VK3WI's broadcast at 11.30 that morning.

AMATEUR CALL SIGNS

FOR MONTH OF DECEMBER, 1952

ADDITIONS

UK— New South Wales
2KCC—H. A. Colbeck, 3 Murray St., Lidcombe.
2AVP—E. Penick, Turner Hostel, Canberra City, A.C.T.

Queensland

4ED—K. A. Taylor, S.S. "Matthew Flinders," c/o H. C. Sleigh, George St., Sydney; Home Address: Cartwright St., Ingham, North Queensland.
4JN—J. N. Blake, 22 Latchford St., Pimlico, Townsville.

South Australia

5FR—W. F. Franzl, 7 Short Ave., Da Costa Park.

Western Australia

6EZ—J. R. Moyle, c/o W. Lee, South St., Seely Bay.
6JT—J. K. Twycross, Boya Crescent, Boya.

Tasmania

7RW—R. J. R. Walker, Government Aerodrome, Flinders Island.

Territories

1JC—J. T. Carr, Heard Island.

ALTERATIONS

New South Wales
2NB—19 Tusculum Street, Portia Point.
2ABC—6 Alma Road, Maroubra.
2AKZ—6 Evelyn Street, Sylvania.
2ALZ—12 Maria Street, Toongabbie West.
2ANL—St. Mary's Presbytery, Newcastle.
2ASW—18 Hollywood Street, Kogarah.
2AUG—97 Donald Street, Hurstville.



Victoria
3EL—Albert Hill Road, Lyndale.
3MO—11 Valley View Road, Glen Iris.
3OO—Main Road West, St. Albans.
3RX—1 Seaton Street, Glen Iris.
SSQ—Dept. of Civil Aviation Aerodrome, Mangalore.
3AGC—55 Dendy Street, Brighton, S.S.
3ANR—"Blagdon," Stilwells Deviation, Avon-sleigh.

Queensland

4FA—55 Kate Street, Morningside, Brisbane.
4SE—C/o. Flying Doctor Base, Cloncurry.
4TG—Station on board S.S. "Cape Leeuwijn,"
Post Address: 53 Amarina Ave., Ash-grove.

South Australia

NJM—16 Willoughby Street, Ferryden Park.
NSL—25 Tarragon Street, Mile End, Adelaide.
50K—21 Hampton Street, Brooklyn Park.
5UX—Cook.

Tasmania

7DH—Esplanade, Montagu Bay, Hobart.
7MG—949 Sandy Bay Road, Hobart.

DELETIONS

New South Wales: VK5 2EE (now operating under VK8EEZ), 2LJ, 20Q, 2ASG.
Victoria: VK4LL.
Queensland: VK4FR (now operating under VK3FR).

FOR MONTH OF JANUARY, 1953

ADDITIONS

New South Wales
2AAF—A. J. Fisher, 76 Railway St., Rockdale.
2AEW—J. G. E. Robinson, 43 Tryon Rd., Lind-field.
2AOG—M. T. Gabriel, 98a Bellevue Rd., Belle-ue Hill.
2AQH—N. A. Miller, R.M.B. 585 Anthony St., Blacktown, Sydney.
2ARN—R. F. Meany, 16 Lightcliffe Ave., Lind-field.
2AVH—C. M. Adams (Mrs.), C/o F. Brabazon, Kallista St., Beacon Hill, via Brookvale.

Victoria

3UU—E. R. Wilks, 52 Clyde St., Thornbury.
3WU—J. Medlicott, 9 Laurie St., Newport.
3AHW—A. W. White, Naval Residence F38, Crib Point.
3AJO—P. A. Orchard, 20 Railway Pde., Highbt.
3AST—S. J. Lloyd, Jasper Ter., Frankston.

Queensland

4FY—A. Fong Yan, Crosby Rd., Albion, N.S.
4WM—M. W. Madrick, Pool Store, Flinders Pde., Sandgate.

South Australia

5GH—B. K. Symonds, 1 Harrow Ter., Kingswood
5LL—G. F. Lucas, 2 George St., Stenney.
5OV—V. Huser, 2a Way St., Kilburn.
5WN—W. B. Johnson, 10 Ward St., Nth. Adelaide

Tasmania

7DC—D. H. Clifford, 8 Strahan St., Nth. Hobart.
7NB—N. L. Bonney, Station: Gawler Rd., Uverstone; Postal Address: P.O. Box 22, Uverstone.
7TY—W. W. Watson, 58 Brooker Ave., Moonah.

Territories

1AF—A. S. Little, Macquarie Island.
1SK—K. E. Dabriel, Heard Island.
4DS—D. C. O. D.C.A., Port Moresby.
9MT—M. Tie, C/o D.C.A., Port Moresby.

ALTERATIONS

UK— New South Wales
2AV—89 Stoney Creek Road, Beverly Hills.
2BF—35 Stevenson Street, Birrong.
2MK—25 Glamis Street, Kingsgrove.
2QY—10 Mandurah Street, Croydon.
2TG—C/o Central School, Bellingen.
2UP—Flat 4, 7 Ramsgate Avenue, Bondi.
2ADG—12 Campbell Street, Ainslie, A.C.T.
2AOM—Flat 10, "Manar," Macleay Street, Elizabeth Bay.
2APA—"Little Head House," Norma Road, Palm Beach.

Victoria

3DA—Streton Crescent, East Ivanhoe.
3DZ—39 Gourlay Street, Balclutha.
3IZ—High School, Maryborough.
3NL—13 Gleason Avenue, Burwood.
3OX—40 Robney Ave., East Nalwern, S.E.S.
3OZ—Warrandyte Road, North Nalwern.
3ST—73 McKean Street, Box Hill.
3WT—141 Albert Street, Sebastopol.
3AFP—139 Madden Avenue, Mildura.
3AOD—190 Latrobe Street, Warragul.

Queensland

4AG—"Inglenook," Maloja Ave., Caloundra.
4CH—142 Lutwyche Road, Windsor, Brisbane.
4CJ—14 Knutsford Street, Rockhampton.
4DB—23 Urquhart St., Carralong, Townsville.
4FG—371 Hawken Drive, St. Lucia.
4MA—State School, Benaur via Kingaroy.
4SX—29 Ungler Street, North Mackay.
4RF—27 Primmer Street, Coorparoo, Brisbane.
4WS—"Evley," Walton Street, Southport.

South Australia

5CB—345 Brighton Road, Somerton Park.
5CH—Agnis Street, Mt. Gambier.
5DH—100 Rumbold Avenue, Finchley Park.
5KH—15 Oakland Road, Marion.

Western Australia

6SK—Lot 18, Evans Road, Mt. Helena.

Tasmania

7JP—"Quocba House," Quocba.
7LS—24 Crotty Street, Queenstown.
7SL—Frannere Road, Mowrah.
7YL—39 Willowdene Avenue, Sandy Bay.

DELETIONS

New South Wales: VK5 2DE, 2ACZ, 2ARV.
2ALV (now operating under VK8DS), 2APW.
Victoria: VK5 3ED, 3VB (now operating under VK2AVH), 3WD, 3XT.
Queensland: VK5 4ET, 4FP.
South Australia: VK5 4AQ (now operating under VK1AF), 3LA, 5TT.
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"Wireless World" £1/16/-, "Wireless Engineer" £2/18/-, "Wireless Electrical Trader" £2/5/6, "Shortwave Mag." £2/1/-, "Listener" £1/7/6, "Electronic Engineering" £1/15/-, "Practical Wireless" 17/6, "Practical Television" 17/6, "London Calling" £1/12/6, "B.B.C. Quarterly" 12/-.

AUSTRALIAN . . .

"Amateur Radio" 12/-, "Radio and Hobbies" 18/-, "Listener In" £1/12/8, "Radio and Electronics" (N.Z.) £1/7/6, "Radio Electrical Weekly" £2/10/-.

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FIFTY MEGACYCLES AND ABOVE

Compiled by J. K. RIDGWAY, VK3CR.

NEW SOUTH WALES

The next meeting of the V.h.f. Group will be held in the Small Hall, Science House, on 6th March, 1953.

50 Mc.: This band has been only fairly active during the last month, a few scratchy break-throughs to VKs 3, 4, 5, 7 and ZL being reported. Perhaps the VK4s have been the best during last few weeks coming in for an hour or so at a time. The usual Sydney and Country Stations holding the fort. 2GU and 2WH have been heard and worked in Sydney.

144 Mc.: As usual this band has been active and the highlights of this month being that VK2EWM (WA) has worked three country stations while at Pymble, a suburb of Sydney, approx. 650 ft. a.s.l. all gear including 3 element beam being mounted on the car. Stations worked: 2WH Forbes, 2PM Canberra, and 2GU also of Canberra. Signals (phone) being S6/7 both ways. A fine effort WA.

Ted 2ABO took a trip to Kembra Grange via Wollongong and return. While travelling down the new road at Bulli Pass, he contacted 2AZN located at Normanhurst. Signals S8, they worked all way down to Stanwell Park. Ted reports hearing 2HL, 2LG, 2APQ at S8 there. Then he contacted 2ANF and signals exchanged were S8/9, they were in contact all the way to Wollongong. The report at Coke Ovens was S9, thence on to Unanderra where John lost Ted. Now what about it Wollongong gang, a 3 element beam and small power. Excellent effort Ted.

Ron 2PM, Canberra, had a field day recently having worked seven Sydney stations at good strength: 2ANF, 2HO, 2WJ, 2QW, 2AJZ, 2NP, 2APQ and heard 2HE. Ron has been quite consistent here in Sydney.

2WH is of course the most consistent of all the country stations being heard every night in Sydney. 2ATO, mobile on foot with small portable equipment and batteries, QSOed 2ANF from Currawong Becroft Head, 87 miles south from Sydney, at water level. The contact was scratchy though he had only 4 watts input. He reports hearing 2APQ S6, 2HO S7. Another good effort.

2HL, while 3,400 ft. up and 38 miles east of Cooma at a place called Countagory, heard three carriers coming from the south on 144.63, 144.9 and 145.1 Mc. on the 12th and 18th January at approx. 2000 hrs. to 2145 hrs. Cooma time. Horrie reports no signals from Sydney, or further north.

An old member of the Gladesville Club, E. Griffiths, the mobile organising champion, is to be congratulated on the hard work he had put in last year and this year, a really stout effort.

The Burwood Radio Club will be on 144 Mc. after a long absence; we welcome them. The call may be 2ARF temporarily. Where is 2ANU Muswellbrook and 2VU of Singleton; no sound of them on 144 Mc.

2AOE is re-building on 144, he has had mod. osc's. We should have another good signal soon. 2ANF is building a bigger and better beam and it will also be higher. Watch your S meters fellows.

Where is 2ALU, 2ANK, 2PU, 2AWZ, 2KR and 2GA? How about a show boys.

Please note that Canberra calls north at 2035 hrs. each night so put beams south. This also affords us the opportunity to hear any VK3s who beam north nightly.

2WH looks towards Sydney each night at 2000 hrs. so watch west. You may hear a VK5 also. Rumour has it that Ted 2XX may build a cascade converter for 144 Mc.—2HO.

VICTORIA

The main items in the notes which were to have appeared in last month's issue are included in the following. At the December meeting of the Group Russ Coleston 3XK, gave a talk on his experiences in Papua last year. Engaged in lighthouse service, he was stationed on Samarai Island and, in his spare time, operated on 6 mx and other bands under the call sign of 9XK. Running 18w. on 6 mx many contacts were made with VK and ZL and an interesting condition he noticed was that about 90% of these were made during daylight hours although much listening took place up to midnight.

It was announced at the meeting that the prizes available for the v.h.f. field day contest are radio valves as follows: Tx section, 1st prize one QQCO/15, 2nd prize two 5763s; Rx section, 1st prize two 6J6, 2nd prize two 6SH7 and one 7193.

On the field day of 14th Dec. good weather prevailed and country stations operating portable did well. 3ZL contacted 13 stations from Mt. Buninyon and 3UI made 11 from Mt. Major, both on 2 mx. With his new 6 mx mobile set-up, 3UI also raised ZL3AR.

Openings on 6 mx were scarce during the early part of the Ross A. Hull Memorial V.h.f. Contest. However, good conditions prevailed as the new year approached. VK9BD appeared on the band and contacted a number in VK3 and other States. 3ATN of Birchip, is now active on 6 mx. Further occasional reflected skip effects have been noticed during openings. In one instance VK3 and VK2 in QSO obtained best results when both directed beams northwards. At the time, VK4 sigs were very strong.

With proposed renewal of activity on the 288 Mc. band in Melbourne, some brief news of 220 Mc. doings in U.S.A. may be of interest. Recently W5BDT and W5RCI contacted over a distance of about 525 miles, home station to home station. Previous to this W1HDQ and W8BFQ held the record, the distance being 450 miles.

At the January meeting of the Group the first application for the V.H.F. C.C. Award was received from 3ABA. This award (see "A.R." March, 1951) is available to those who contact 100 different stations on bands above 100 Mc. and submit confirmations for same. Two 144 Mc. converters were on view at the meeting. Ted Howell was there to describe his broad band triode job which uses three 6J6 tubes, one as a p.p. r.f. amplifier, the second as a p.p. mixer and the third as a p.p. osc., with i.f. output

at 7 Mc. The other converter belonging to 3DG utilised the r.f. section of an American A.S.V. rx. This was a good example of what can be done with disposals equipment to provide a neat job having good performance. Two r.f. stages using 956 acorns feed into a 954 as a diode mixer. The oscillator is a 955 and the i.f. output is on 12 Mc.

3AGV, of Colac, reports that he listens for Melbourne signals on 2 mx at 7, 8 and 9 p.m.

3ZL comes on 2 mx most evenings at 9 p.m. with beam towards Melbourne.

Referring to the Interstate skeds on 144 Mc., we remind you that VK7 stations call us each evening at 2000 hours for three minutes, then listen during the next three minutes. VK2 stations call us at 2030 hours for five minutes, then listen for us for the next five minutes.

The first v.h.f. field day for 1953 took place on 14th Feb. The excellent weather conditions, 3UI, 3APF and party operated on 6 mx from Mt. Hickey and on 2 mx 3ADU at Mt. Gellibrand, 3JO at Donna Buang, 3UI and 3YS at Mt. Hickey, and 3EQ at Tower Hill near Warrnambool. Most portables made 9 to 12 contacts. Mt. Hickey, near Tallaroak, a previously untried location, proved to be good for both north and south directions, the altitude being approx. 2,650 ft. above sea level. 3EQ, together with Eric Giddings and Bill Wines, made it up at last to Tower Hill. 3RK was heard at good strength, also an unidentified signal. However, no QSOs were made although many calls were given. They plan to try again on the next field day. 3APF, using his new 6 mx mobile unit as a portable, worked 3IM with good signal strength. A number of metropolitan stations were on as well as 3AEB at Lower Macedon. 3ZL at Ballarat got through on 2 mx to Mt. Hickey.

3YS tried some 2 mx mobile work with the new 7w. portable rig, temporarily set up in the car. Contact was made with 3UI and 3CI while approaching the top of Mt. Hickey. Later, while returning home on the Hume Highway, 3IM, 3PG and 3CP were contacted, commencing at Pretty Sally Hill.

As far as known, no Interstate signals on 2 mx were heard during the field day.

There are two more field days for this season, the dates being: 15th March and 26th April. Help make the contest a success. Send in logs, big or small, home or portable. To those concerned, don't forget the receiving section, send in your logs also. You may win one of the prizes mentioned. The log requirements and contest rules are set out in the v.h.f. notes of the last December issue of "Amateur Radio."

The next V.h.f. Group meeting is on the 18th March at 8 p.m., in the Institute Rooms, 191 Queen Street.—3ABA.

SOUTH AUSTRALIA

Had a crack at old Joe 'tother night. He took me quite seriously, too! There is no obligation to use the phonetic alphabet as listed, but all jokes aside, why the fancy individual efforts? These defeat their purpose, lose us friends, and I am sure that such phrases as "apples, oranges and cabbages" do not impress the listeners.

It seems the boys at Mt. Gambier are doing a good job on 144 Mc. with a

round up of enthusiasts on Monday evenings. Would like to have more details of doings down there.

5KL is believed to have a real 50 Mc. rig well under way but I am afraid that it will be neglected whilst the OM is holidaying in VK7. Lance has put a really fine signal into Adelaide in the past and we are looking forward to hearing it again.

'Tis quite some time since we heard anything of the activity along Ole Man River. What about it Hugh? 5KL tells me that he did quite a bit of listening on 50 during the few weeks he was in Pirie. Unfortunately he did not copy one signal. This is rather difficult to understand. One hesitates to suggest to Clarry that he was off frequency, but that is a possibility. Let's hope this

news will not discourage other mid-northern residents.

Looking through my QSL cards, I was surprised to find that there were only 62 confirmed contacts. Can anyone claim the century on 50?

It seems to me that those chappies who regularly re-broadcast the W.I.A. sessions each Sunday morning are worthy of a few words of praise. Not that this is the object of the re-broadcast, the stations concerned are more interested in receiving reports of reception. These reports appear to be few and far between. Need more be said? Perhaps just the stations and bands—50 Mc. 5HD, 144 Mc. 5GL.

Two new calls this month are 5NL and 5LR. It is hoped that more will be heard of these boys. Your scribe is lamenting, (1) he missed the VK9s, (2) he is being sent to Melbourne for three months.

5GA who is very pleased with the performance of his xtal converter reports an excellent opening on Saturday, 31st January. No doubt a transmitter will follow and there'll be one more VK5 for 4BT to work!

The matter of "cross band" working on v.h.f. is still causing considerable heart-burning. No doubt this will be fully discussed at the Convention.

5XU has volunteered to write this column for the coming few months. Please let Gordon have all the gen until further notice.

It is regretted that there is no mention of the 288 and 576 Mc. enthusiasts. I make no apologies. I would be only too happy to record the doings on these frequencies if those concerned would just give me a ring, drop a note in the post or contact 5WL—5JD.

LAUNCESTON (from VK7LZ)

Although the general opinion from the southern States was that 6 mx was not as good as in the last couple of seasons, my experience here was that more contacts were available whilst the band was open due to the greater number of stations on the band this year.

Only two stations were active in Launceston, 7BQ and myself. 7AJ operated occasionally from Hobart and 7AB from Devonport. 7AB managed to contact VK9DB in Papua.

Nothing startling was worked from here, the districts contacted being VKs 2, 3, 4 and 5, and ZLs 1, 2, 3, 4.

The band was only open properly to ZL twice, on the evening of the 14th January and again on the 16th. On the 14th ZL1, 2 and 3 districts were heard at S9 and on the 16th ZL3 and 4 came through; however, signals did not last and QSB was very apparent.

A notable feature of the band this year was the fact that 3RR in Horsham was available for VK7 contacts and this station could be heard when in the past it was possible to go through a whole season without hearing a VK3. My last QSO to date on 50 Mc. was 4CU at 1015 hrs. on 25th Jan.

Here are brief details of the 2 mx activity in Launceston: 7BQ on 145.35 Mc., input 30 watts, antenna 4 el. Lenfo, Rx 4 tube cascade converter. 7FF on 145.92 Mc., input 40 watts, antenna 5 over 5, Rx 4 tube cascade converter. 7LZ on 144.45 Mc., input 30 watts, antenna 12 el. stacked array, Rx 4 tube cascade converter.

16th B.E.R.U. CONTEST

TELEGRAPHY: MARCH 28-29

TELEPHONY: APRIL 11-12

24-Hour Quota

A few important changes have been introduced into the rules for 1953 in an attempt to overcome some outstanding difficulties.

There is one week-end each for the c.w. and phone events, but the **starting time is your own local Saturday noon**, and the **finishing time your own local Sunday midnight**. Out of that 36 hours you can work as you like to a total of 24 hours, but every session must be at least one hour of the total. The problem is to provide 24 hours' operating time, and spread it through the week-end without having to start Canada on Friday, or finish New Zealand on Monday.

A number of zones have been grouped in order to reduce the number of "one man" zones and VK and ZS have been re-arranged. In order to prevent "G paralysis," Great Britain has been divided into three zones for stations outside the U.K.; the division is by figures and not prefixes.

The new prefix zones for VK are: VK2 and VK4, VK3 and VK7, VK5 and VK6; VK9 is linked with VR4.

The event is divided into three sections, namely: (a) senior telegraphy (max. licensed power); (b) junior telegraphy (25 watts maximum input); (c) telephony (max. licensed power).

The telegraphy event (senior and junior) takes place from 1200 local time, Saturday, March 28, till 2400 local time, Sunday, March 29; and the telephony event from 1200 local time, Saturday, April 11, till 2400 local time, Sunday, April 12.

Operation may extend outside the local time limits given above, but no points may be claimed for any contacts made in this way, though they may be logged.

All entries must be posed within 14 days of the close of the relevant section—postmarked not later than April 13, 1953, in the case of the Telegraphy Contest, and April 27, 1953, in the case of the Telephony Contest. Entries must be addressed to the B.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1. The closing date for the acceptance of entries is 1st July, 1953.

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DX NOTES BY VK7RK*

Have often been unfavourably impressed by the QSO that opens with "plessed to meet you for the first time OM" when it really is the second or third time contact has been made, and wonder how many of the DX hunting fraternity just relegate each QSO to a place in the log and rely on memory or how many keep some sort of index system to record past operating.

It is amazing how much more enjoyable either DX hunting or just plain rag-chewing can become if an index is kept of all stations worked. Just to be able to answer a call using the other chap's name first up bolsters his ego immensely and to know if previous contact has been made without having to thumb right through the log saves your own time and QSL money to say the least.

An excellent article, written by VK3UM, appeared in "A.R." many moons ago, July, 1947, to be precise, and was entitled "DX Book-keeping." To anyone interested enough to go through those back issues and adapt the scheme to suit his own needs, I'll guarantee the time not to be wasted.

Operating for the month seems to have been confined once more mainly to 14 Mc., the other bands suffering of course in the process.

3.5 Mc. brings not one report, my own experience being that nothing could break through the solid wall of QRN.

7 Mc. 2AMB still getting around with QZ5V5*, W6ING/KM6*, HS1VR*, VQ2GW*, XE2LA, MB9CA (the VQ2 gave Laurie 7 Mc. W.A.C.). 4XJ worked HS1VR, HB9EU, JA6HA, VU2AT, VS6CG, VS2CN, SM4AEE and DL7AA, while s.w.I. Don Granley's ear caught ET1TKK, F3MS, AP2R and VA0KFA. 3AHH and myself heard and worked the usual Ws during evenings and Europeans early mornings, but neither as numerous as they have been during the last few months.

14 Mc., as usual, is the old stand-by and has been behaving in much the same way as we have been accustomed of late. Late afternoons and evening bring Central and South Americans, 1200z onwards the Europeans. Most reports indicate Africans also about this time although Africa seems to be almost a dead continent for me at present, particularly the southern portion. Some good contacts can usually be had with JA and KA stations during evenings—one KA I was listening to was using 1 k.w. and a 3 el. w.s. rotary atop an 80 ft. tower—no wonder he was S9.

3AHH reports condx very good during the first half of the month, working ZC4IP, M13LK, ZS1G, GI4RY, MP4BBD, MP4BJG, JA3TZ, JY1RT, HS1VR, VQ4DO, SU1GG, MP4HBK, XZ2OM, IS1FIC, DU1CV and hearing AP2N, FB8BB, OD5AD, IT1AT, FQ8AP, F18AZ, HZ1AB and FN8AD although Hans, together with others, casts some doubt as to the authenticity of the last mentioned. 2AMB enjoyed himself to extent of M13AB*, CE4BX*, CP1BX*, YK1AH, FN8AD, JY1BB, ZC4IP,

VQ3BM and VQ4DO. Don Granley confined his listening time between 1200z and 1600z and managed OD5AB, FN8AD, LZ1KAB, 4UAS, YK1AH, HZ1AB, ZM6AA, GI4RY, OK1KRC, M13US, JY1BB, JY1RT plus the more common Europeans, Asiatic and Pacific stations.

Short skip on this band one night enabled me to get some dope from more of the VK3 gang who came up with the following: 3CX goes to 179 worked with ZC3U* and also swapped reports with KV4AA*, VP3TF*, SU0WP*, ZB1BJ*, CP1BX*, HC2OT*, GD3UB*, BIAB*, HH2FL*, S43TZ*, LZ1KAB*, VP9AP*, FQ8AP*, SU1GG* and heard CR4AF. Alan also tells me that 5BY goes to 201 with YK1AH*. The score current at 3KB is 203 worked and 192 confirmed. 3JJ has a handy chunk which includes FM7WD*, OD5AB*, CE3AY*, CE4BX*, LU7EO*, M13LK*, VQ4NZK*, VQ4BY*, YV5DE*, SA3TY*, FB8BE* and TF3NA, ST2HK, VP8AU.

3AWW is one who would not enter any phone versus c.w. controversy as his operating seems evenly divided, the c.w. section shows the following worked: ZS2U, FB8BB, ZB1JG, VK1JC, VQ4HJP, OE1AX, FN8AD, M13AB, MP4BBE, IS1FIC, IS1CFX, KZ5AS, VQ3BM (at 0630z), JY1RT, OD5AB, AR1AH, AP4A, LZ1KAB, FQ8AP, CR7IZ, HZ1AB, SV0NE, OD5AF, KV4LA, ZE5JU, BU missed out on FR7ZA HA7PA and MP2AG. Here at 7RK, found enough time to work HA5FA, DU1EC, HC1FG and heard FB8EG, JY1RT, 4X4BN, ZC4IP, TA3AA, KL7IAZ, OD5AO, CR9AF, KZ5GH, KJ6AY, 954BS, OH5NK, YU3BC, OK1MB.

An interesting letter from Alan 9YY received just too late for mention last month tells of his DX doings in Lae. The first 108 contacts provided 23 countries with prefixes like LU, VS6, VS7, FO8, JA, VU, KL7, FK8, SM, CE, ON, DL, YU, KR8, G, F, DU, CN8, etc. VK and ZL provide most of the QRM being S9 most of the day through to 1200z. Alan promises 100% QSL and his QTH is listed later.

Phone on this band brought me my only new one for the month with HR1BC. Also heard VQ3VM, HS5S, MP4KAC. 3AWW's phone activity brought him ZS1ND, VQ5CY, GD3BU, HZ1SD, ZB1KQ, MP4KAC, M13AB, CR8BX, CR7BB, VK1JC, FA3KC, CR0FW, AP2R, SU5EB, VP6SD, SA3TK, KTIWX, HZ1TA, FQ8AP and those that got away were FB8ZT, AG2AB, VQ3BU, SV0WP, VQ5CB, ZSTC. 2AMB spoke with HP1CC. 3AHH, not often on phone, but did manage MP4KAC, and chased without success VK1HM, HZ1JA and HZ1AB. VK6/4222 evidently does lots of listening and has an imposing array of calls like VS1, VS2, VS7, JA, KR6, KG6, VU, W, G, ZS and M13MK, FR7ZA, TA2A, HZ1TA, 4X4CR, SU5EB, VS9AW, ZA1AA, VQ3AL, VQ8AL, ZE1WD, MP4ABK, SA3TX. 4CW left 50 Mc. alone for long enough to work MP4KAC, VS9AW and heard GM3DHD, SA3TK, M13LK. EQ3AL was heard by local s.w.I. Henry Solomon in contact with 6KW. Would like some of those VK6 boys to drop me a line some time.

21 Mc. did not evoke a single comment this month and my only QSO for the month was with F3TP.

28 Mc. You guessed it. 4XJ the lone voice with KH6AGY*, KH6FC*, KH6AARN*, KH6AFS*, KG6ADY*, W6CEU*, HC1FS*, all on phone.

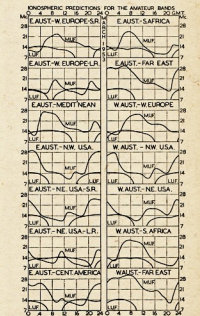
QSLs received during the month by 2AMB were OA4ED for 7 Mc. and HC2JR. By 4XJ: DU1AL, GC2FZC, CR9AF, VQ4HJP (21 Mc.), HZ1MY, VR3C, ZC4IP. 7RK: M13LK. 3AWW: F18AB, MP4BBI, CR6BX. 3AHH: SU1GG, MP4BBD, MP4KAC, YV5AB.

Favourable comment has been received on the publication of QTHs, so a few more are included, largely contributed by 3AHH and 3KB with a few from myself:—

OD5AB—Box 203, Beirut, Lebanon. YK1AH—Box 35, Damascus, Syria. MP4BBD—Box 613, Awall, Bahrain Is., Persian Gulf. SA3TZ—Box 372, Tripoli, Libya. HS1VR—Army Signal Corps, Bangkok, Siam. VQ4DO—Box 4260, Westlakes, Nairobi, Kenya. XZ2OM—Box 1490, Rangoon, Burma. MP4KAC—C/o. British Oil Co., Kuwait, Persian Gulf. FQ8AP—Box 31, Fort Archambaud, Fr. East. Africa. VU2DHF—Box 534, New Delhi. HC1FG—Box 2799, Quito, Ecuador. VK9YY—C/o. A.W.A. Aviation Service Depot, P.O. Box 13, Lae, T.N.G.

From what I can gather it seems as though the W Class B license has been extended to include 14 Mc. phones as from January while the Ws go down on 7.2 to 7.3 Mc. from February. 3AWW comments that the fact of HS1SD being the license of the Crown Prince of Saudi Arabia may have something to do with the power of the station which is 1 k.w.; which may have something to do with the strength of the signal he lays down here.

PREDICTION CHART FOR MAR, 1953



* 5 Galvin Street, Launceston, Tasmania.



FEDERAL, QSL, and DISTRICT NOTES

Federal President: G. GLOVER

(VK5AQ); Federal Secretary: G. M. HULL (VK5BZ); Box 2611W, G.P.O., Melbourne.

NEW SOUTH WALES

President: John Moyle, VK3JU.

Secretary: David H. Duff (VK2EO), Box 1734 G.P.O., Sydney.

Meeting Night: Fourth Friday of each month at Science House, Corner Gloucester and Essex Sts., Sydney.

Divisional Sub-Editor: Harry Powell, VK2AYF, 9 Russell Avenue, Wahroona.

Zone Correspondents: North Coast and Tablelands: Noel Hanson, VK3AHH, Ryan Ave., West Kempsey; Newcastle: Roy McD., Stuart, VK2ASJ, 48 Dunbar St., Stockton; Caddell and L. H. Harty, VK3YJ, 27 Comfort Ave., Cessnock; Western: W. H. SHUT, VK2WH, Camblawa, Forbes; South Coast and Southern: Roy Raynor, VK2KD, 42 Pettit St., Yass; Eastern Suburbs: Don Knick, VK2NO, 42 Yanko Ave., Waverley; Northern Suburbs: Harry Powell, VK2AYF, Russell Ave., Wahroona; St. George: Chas. Coyle, VK3YK, 84 Carlton Cres., Kogarah Bay.

VICTORIA

President: G. Dennis, VK3TF.

Secretary: L. R. Bradshaw, VK3K5S.

FEDERAL

EASTER CONVENTION 1953

At the 1952 Convention held in Sydney last year an almost unanimous vote was cast to hold the next Convention in 1954. No man can be condemned outright for changing his mind if he has a concrete reason for changing it. The Federal Council has changed its mind and is prepared to hold its Convention in Melbourne this year.

The Federal Conventions have mostly been held over the Easter recess and this one will be no exception. Don't forget as a member you are entitled to sit on the proceedings if you so desire. It will be held probably in the rooms of the Victorian Division of the W.I.A., 1st floor, 181 Brien Street, Melbourne. If you can't get in, go along to the phone box at the corner and ring FJ 6997, or if you have a car send a "wick-eddy" on the horn; somebody will probably come and let you in. More about this in next month's issue.

After receipt of this issue you have a few days left to let your Division have any agenda items you desire discussed at the Convention. But don't forget you put your Council in to decide things on your behalf, so if your Council considers your requirements of a nature that can be attended to at an administrative level, they might not reach the conference table. If they don't reach the Convention, then follow them and see that your Council attends to them at the administrative level and doesn't pigeon-hole them to collect the dust of ages.

APPOINTMENT OF FEDERAL EXECUTIVE

In accordance with Section 21 of the Federal Constitution the Headquarters Division has notified the Federal Council of the following appointments to the Federal Executive for the year 1953-54:

VK3AG, Mr. G. Glover, Federal President.
VK3WG, Mr. W. Gronow, Federal Vice-Pres.
VK3KZ, Mr. G. M. Hull, Federal Secretary.
VK3AGC, Mr. G. A. Ewin, Fed. Treasurer.
VK3KJ, Mr. H. Kinnear, Federal Publicity Officer.

In addition to these official appointments, the Federal Executive has co-opted the following persons to serve as members of the Executive:

VK3KAO, Mr. J. Oxley, Asst. Fed. Secretary.
VK3BZ, Mr. G. I. Morris, Fed. DX C.C. Manager.

VK3FJ, Mr. D. Paine, Fed. Traffic Manager.
VK3RH, Mr. R. Jones, Federal QSL Manager.

Under the powers given to it, the Federal Executive may employ any number of personnel to undertake special work, and in this regard it is proposed to increase the working groups during the next year for the purposes of carrying on assigned projects of long life nature.

NO MORE TELEVISION BOOKLETS

The supply of F.I. Booklets, edited by Philip S. Rand of Remington Rand Laboratory of Advanced Research, South Norwalk, Conn., U.S.A., and graciously supplied to the Institute for free to its members, has rapidly disappeared since the paragraph in F.E. Notes for February. It certainly takes some of you boys a tolerable long time to write a letter.

Now, of course, a large number are being disappointed by not being able to obtain one.

Administrative Secretary: Mrs. J. Hurley, Law Court Chambers, 191 Queen St., Melbourne.
Meeting Night: First Wednesday of each month at the Radio School, Mob. Technical College.
Divisional Sub-Editor: K. E. Pincott, VK3AFJ, 14 Duncombe Ave., Ashburton, S.E.I.

Zone Correspondents: T. S. Rodda, VK3ATR, Box 234, Warracknabeal; South Western: P. Perkins, VK3APK, 182 McKillop St., Geelong East; North Eastern: A. D. Buchan, VK3FD, "Brooklands" Warrigal, Far North Western: M. Folie, VK3OZ, 191 Lemon Ave., Mildura; Eastern: Les Dwyer, VK3SG, and Bathurst: Norman D. C. Case, VK3ACE, Cumming Ave., Bircipch.

QUEENSLAND

President: V. Jeffs, VK4VJ.
Secretary: J. F. Pickles, VK4FP, Box 633J, G.P.O., Brisbane.

Meeting Night: Third Friday in each month at the L.R.E. Rooms, Wickham St., Valley.
Divisional Sub-Editor: G. Gifford, VK4AP, 38 Bramston Tce., Herston, Brisbane.

SOUTH AUSTRALIA

President: W. W. Parsons, VK3PS.
Secretary: W. J. KERR, VK3B, Box 1343K, G.P.O., Adelaide. Telephone: J 1151.

If we can stretch our friendship that far we might rack up enough audacity to drop a line to friend Philip and ask him for a few more. But don't send your stamps in yet, we might not get any more, in any case the postal rates might have increased before they arrive; it did last time!

We would, however, ask those members who received a copy to share the information contained therein with their fellow Amateur. Use them to good advantage, incorporate the idea of l.v.l. proofing in all your new gear that is capable of radiating interfering signals, become l.v.l. conscientious, and you are going to save yourself a lot of trouble later on.

— — — — —

FEDERAL QSL BUREAU

RAY JONES, VK3RJ, MANAGER

WEBBY, Leon W. Brammer, 1227 Princeton St., Delano, Calif., plaintively asks "is there any method of wringing a QSL out of VK3DJ and VK6GU?"

A card addressed to the deceased VK2, was returned to G. W. Gurnea, signed, signed endorsement. It has again been returned to VK with the further endorsement that the sender is also endorsed.

The R.E.F. will not accept any FI cards for their D.U.F. awards. Apparently up to the present time these FI gentlemen are unlicensed.

Treb. B.E.R.S. 95 takes pride in finally obtaining cards from VR1F and CR3UP, both after two years of effort. Treb. supplies the last issue of the Call Book: ZM5AA—Pat Senior, Box 23, Apia, W. Samoa. ZM5AC—Arnold Stanbury, Observers, Apia, W. Samoa. ZC3VS—F. S. Hugh, Sandakan, Br. Nth. Borneo. KA0LI—Larry, A.P.O. 815, C/O. P.M. San Francisco, Calif. F8SAK—Margaret, Box 971, Dakota, W. West Africa. Z3/7—Eric Jacobs, Jr. (W6FBJ), 3531 Dwight Ave., Riverside, Calif. OX3AX—Tingimarrut, Greenland. ODSB—Ben, Box 125, Rangoon, Burma.

Writing under date of January, 1953, Eric Macklin, VK1EM, of Macquarie Island, says radio conditions have not been terrible but are now getting better. The middle of winter when all bands were dead at night. The gear which is owned by VK1RG, who uses it in conjunction with Eric's, now has a band from 3.5 to 28 Mc. and ends with an 897 with 50W. Modulator is pair 80's in ABL. Antenna current is also a lazy H. Although they have no difficulty working in Northern Europe on 14 Mc., Southern Europe and Northern Africa cannot be heard although the beam peaks on that location. W station, in England, which could be worked all day a few months back. On 7 Mc. a few Europeans have been worked and the local W station has been heard during their stay at Macquarie and in some ways regret that their tour of duty is drawing to a close. Also, a radio, a tape, and reading and billiards to fill in the time. Outside the billiards to fill in the interest with thousands of seals and millions of penguins. The visit of the "Cathart" will be a real treat, and with delight bringing with it their first mail, and providing the opportunity to send letters home to the "Cathart" and to the "Cathart" slavishly while the vessel was at the island, despatching three full bags of mail, which is

Meeting Night: Second Tuesday of each month at 17 Wymouth St., Adelaide.
Divisional Sub-Editor: W. W. Parsons, VK3PS, 40 Victoria Avenue, Rose Park.

WESTERN AUSTRALIA

President: W. E. Coxon, VK6AG.

Secretary: J. Mead, Box N102, G.P.O., Perth.

Meeting Place: Perth Technical College Annex, 2nd Floor, Perth.

Meeting Night: Second Monday of each month.

Divisional Sub-Editor: W. R. Atkinson, VK6WZ, Box 127, Geraldton, W.A.

TASMANIA

President: R. O'May, VKTOM.

Secretary: F. J. Evans, VKTIF, Box 371B, G.P.O., Hobart.

Meeting Night: First Thursday of each month at the Photographic Society's Rooms, 163 Liverpool Street, Hobart.

Divisional Sub-Editor: V. Dore, VK1JD.
Zone Correspondents: Northern: C. A. Cullinan, VK7XW, 12 Montrose Place, Launceston; Southern: R. Henson, 11 Cunningham Street, Burnie, Tasmania.

no mean output for a mere 14 men. Eric modestly admits that he did take a little time off to join in the social events occasioned by the ship's visit. An accompanying photograph indicates that all personnel are in the pink and all except one, sporting the maximum of hirsute adornments. Scott Little, VK5AF, brother-in-law of Rob, VK1RG (ex-VK3G), will be one of the relieving team shortly to proceed to Macquarie Island.

When mentioning the information in these notes some months back that Jack de Curs, VK5KO, had definitely "given the game away for good," a prophecy was made that "he'd be back." Such has come true for Johnny who has been heard on 3.5 and 7 Mc. in the past couple of months.

The "Totian" was scheduled to leave for Heard Island on 5th February to take down the relief gang for that outpost and to bring back the "Totian" home. This trip will take at least six weeks and several men will be required to Macquarie Island to perform a similar function. Cards from Rob Black, VK3QZ, for his operation before the "Totian" left the call sign VJ1AB are now coming through.

NEW SOUTH WALES

The Annual Hamfest of the N.S.W. Division commenced with the January general meeting on Friday, 23rd, at Science House. The visitors included an international delegation of VK4CI. The highlight of the general business was the unanimous election of Mr. Lionel S. Vickers, VK4VJ, to Honorary Life Membership on a recommendation from the Divisional Council. This is not only a personal tribute to the extraordinary, quietly consistent and staunch efforts with which Lionel has supported the Institute over a period of very many years, but is also a feather in the cap of the Newcastle Branch which has been rewarded from its inception. Congratulations, Lionel!

After the President's round-up of doings and events, the meeting showed signs of running away from the question of the proposed television, which was introduced by Ted ZABO and enthusiastically supported by Bob QZ2. The meeting was then held in time for a lecture by the Hon. Treasurer, Stan QOW (2RX) on the application of films to television, a subject of which he has a very firm grasp. A very interesting lecture was accompanied by two intriguing films—some of what sound actually looks like and the other of what some artist Johnny has picked up. The "Cathart" and its crew are still wondering. Supper was "on the house" and was much appreciated by the large attendance.

The main doings in connection with the Hamfest took place on Saturday, 24th, at No. 10 St. George's St. in the rooms of Mrs. Mackenzie, of course, the classic name for the Institute. A.O.C.P. classes have been held for a long time. The thanks of the Division are due to those members who have volunteered to assist the Council in fixing the place up for the show and most of all to Mrs. Mackenzie and her staff who have put up with the evening mob all the afternoon and evening without a break! Those members who contributed cakes and other goodies were also praised and brought forth a tribute from Mrs. Mackenzie, the author of a cookery book. What with the

other refreshments which were "on tap," the inner man was certainly very well catered for.

Four lectures in competition for the President's Cup were presented by Bob 20A, Adrian 21E, Lionel 2CS, and Bob 2QZ. Lionel stole the show again and romped away with the Cup with a very interesting talk on his new "single control" transmitter with a final tank which resonates on all five bands from 3.5 to 28 Mc. The "herbie" were demonstrated by an output load consisting of two motor car tail lamp globes in series.

The evening was taken up with first class displays of conjuring, juggling, impersonations, funny tape recordings (a la Nev. Williams) and competitions, interspersed with more eating, drinking and napping. Those who could have been there and were not, will be kicking themselves until next Australia Day week-end when we hope they will get another chance.—2GW.

COALFIELDS AND LAKES ZONE

During January, 2ADT was very active at his holiday location—Urnaga, but as most time was spent chasing fish, only passing mention would be fitting in this publication. However, portable gear on 40 and 80 mc kept the outside world informed of the current score. Two other zone members, 2KZ and 2YL, called at Urnaga on the way home from Brisbane. 2PZ spent three weeks at Pt. Macquarie and found time to visit the local shacks. 2YL stayed home to keep things going and reports working some nice DX on 21 Mc. Unfortunately one of the local landmarks disappeared when one of Harry's masts was blown down in a gale.

2VU is spending a holiday on the South Coast. 2ANU is very busy digging holes, standing up posts and stringing wire, but assures me he is only fencing some newly acquired property. 2RU caught the Urnaga bug and joined 2ADT

for a week. What happened to 6 mx with the monitor and custodian of the band absent from his post of duty?

HUNTER BRANCH

1953 commenced in a blaze of glory for the Branch when our President, Len 2CS, was awarded Life Membership of the W.I.A. at the January meeting of N.S.W. Division. Hearty congratulations have been extended to him not only from our own members, but from Hams everywhere. He very modestly says he feels honoured to have been made a member, and that he is very proud to receive it on our behalf. However, we all know he has done an excellent job leading our Executive and guiding our deliberations since the Branch was formed.

This honour was only the beginning, as the Annual Meeting of the Division was held at one for the President and the Branch as a whole. Treasurer 2XT kindly drove Lionel, complete with the 5-band exciter 7x (which he so ably demonstrated at our January meeting), down to the "big smoke" for the Annual Hamfest. The Sydney boys were so impressed with the all-band switched tank circuit, and the few words of explanation given by Lionel, they voted it the best lecture of the evening, and he was awarded the Divisional President trophy! Further honours went to Hunter representatives when Fred 2AGY won a "secret sound" contest.

The same week-end the National Field Day Contest was held and our team did their best to top the score. Actually, there were three portable stations from the Branch in the field this year, even though two operated for short periods only. Max 2OT, who was returning from VK4 by car, put out a wire, and his 11 ft. whip antenna while stopped at Urnaga. Ken 2KG went out Lake way and scored some points with his "Special" rig.

Thanks to the help of Vice-President 2DZ, who provided an adequate supply of fully charged batteries, and Bill 2AXM, who supplied a big tent which housed the ops and gear.

The team which again went to Anna Bay were much more comfortable than previously. Secretary 2SF again did yeoman service. As chief op, 2AHA, 2KG's 2nd op Athol, and 2ASJ to the site on Saturday afternoon. Although loaded well past the plims—12.30, and fully driven by Varley, pulled like a bullock right to the top of the point. The tent was erected by the experienced Athol while Harold and Varley went to cut antenna poles on previous occasions this was the job of our late pal, 2IS—(we reminisced). They collected good sticks and gave Larry Anthony something to think about too! Three men soon erected three poles complete with antennae. Varley returned to town for night, and gave us a good night's home QTH later. Meanwhile 2ASJ gloated while 2AHA and Athol prepared a super meal! Next morning after another good lunch meal, the rig consisting of Type 3 Mk. II, driven by RA10 was soon right in the contest. However, it was soon found the vibrator hash was too loud on RA10 Rx so we had to use the little Type 3 Rx with earphones only.

At this point associates John Borg and Les Baber, who were with us last year, arrived to help with log keeping, etc., and later Varley 2SF returned with George 2AGD and Bert 2CYN to help yell or pound brass. The bands were used and due to f.b. c.w. by 2AHA contacts included W, but only local to work us Jim 2ZC and 2ADT! Bert and George returned home in afternoon but rest of gang was out. We had a grand team, put up a good score, had lots of fun, and those meals of "dagwood" and "greenalbs" are etched in our memory! We are grateful to all who helped, not forgetting Harry 2APX who swapped shifts for Harold 2A to to work the night.

All were pleased to see former Newcastle R.L. Alex Munro, 4JM, who stayed with 2KG while visiting the City; met quite a few of his former "problems" again. Upper Hunter gang were represented at the January meeting by Alex 2JZ, who holidayed at local beaches with his family. Ernie 2FP earned a good 40 on an absence of 23 years! Associates Len Sparke and Leo Pinksavitch should have all signs seen to work the night antenna, but who's his peaches! 2AAI building 2x to end 2x's. 2BZ finishing de luxe shack. 2AFA putting 2A1Z on 2x Mc.

Notice of Meeting.—The Annual Meeting will be held at the Technical College on Friday, 15th March. Main item will be election of officers. Offer your services—don't leave it to the other chap. Special lecture, so roll up.

VICTORIA

The February meeting was held at the Melbourne Technical College on 5/2/53, the roll-up being one of the best in years, approx. 100 being present.

The original agenda item, films, was cancelled, postponed or something, and in lieu

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there of Harry Kinnear (3KN) was "roped-in" to talk on his experiences overseas. Harry had some very interesting comments on i.v., both Amateur and otherwise, to make and his remarks on the restrictions placed on U.K. Amateurs left no doubt that we are far better treated here. Question time brought forth many queries on all subjects from currency to B.C.I. (Bare Chorus Individuals), all of which Harry answered in fine style. There was so much discussion on windmills, I thought Don Quixote (call sign unknown) was in the audience.

A much larger percentage than usual stayed on after smoko for the business of the meeting. In fact, I missed only two or three faces at the second half. Does this mean more interest is being taken in the politics of the Institute? If so, it is a very good sign and augurs well for the future.

Somebody queried the cost of accounting for this Division. From what I heard, the considered opinion of many is that this service is costing too much and other arrangements should be made. I'll wager we hear more on this subject when the annual financial statements are published.

Another controversial subject is "Federal Conventions." As was pointed out to the meeting, much time is wasted debating items of little importance. Far better for each State to submit only two or three items that are really of vital importance, than just something to fill the agenda sheet.

Fred JYS was elected Federal Councillor, filling the vacancy caused by the resignation of Charlie SAUP. To Fred goes our good wishes for a successful term of office. We know he will give of his best in this field, as he does in all other aspects of Amateur Radio. Fred drew attention to the old-timers present, and the President called on them to say a few words which they willingly did, speaking of the days when the W.I.A. was first formed.

The question was recently asked, "What does the member, particularly the associate and student, get from the Institute?" Council has given this matter a lot of thought. As a result, Col 3FO is arranging a hidden transmitter hunt for Sunday, 22nd March, and full details will be found elsewhere in this issue. Here's something everybody can be in, even the XYLs and harmonics, so take your afternoon tea with you to point "X" on Sunday, 22/3/53 and let us hear what you think of the event. Even if you do not join the hunt, you can still turn up and

see what equipment is used, and then get ready for next time.

From my listening during the field day, would say Len 3LN stands a good chance of collecting another certificate. Where do you put them all Len? Eric 80Q back on 20 after a long absence—new QTH too. Peter 3QN had a weekend at home recently, sporting horizontal dipole for five centimetres—"A case for Club" Peter. What about some mobile-marine operation, Pete. Noel 3ANS working on rig, wants it working on all bands for next R.D. Contest. Vern JYE had h.c.i. trouble, but OK again now. Wants to put up a couple of poles, but neighbors not too happy.

Mr. Parsons, may I ask you to remind your fans that 3WI transmits on 7146 Kc. every Sunday at 1130 hours E.S.T. I thank you, and so will the rest of V.I.

How does a chap fill in his spare time when he is located on an island in the Indian Ocean. Correct! He gets a license. In short ZC3AA, on Christmas Is., will be on by May, on 14 Mc. phone. At present he is in Melbourne on leave and looking for gear to take back. Is anxious to meet as many chaps as possible and an invitation to attend the March meeting has been extended. Jim JNY did not know he had such choice DX for a cousin. Wish I could have seen your face when we rang you Jim.

The next meeting on Wednesday, 4th March, will take the form of a Tender Night, so bring along any surplus bits and pieces you no longer want, be they ever so small, somebody else will surely be able to use them.

NORTH EASTERN ZONE

Ken 3KR and Howard 3YV were represented on the January hook-up of the North Eastern Zone by apologies, the former being away and the latter modifying his rig and not able to go on 3700 Kc. Jack 3ZF made a good showing again with his portable rig, and Henry 3IP should make an excellent job of his position of Zone Emergency Co-ordinator according to Alan 3UI. Rex 3UR was the only one to mention his DX ventures, mostly with Kils and KGA, but an SIF was the high-light. Syd 3CI is now free of his plaster cast. Hugh 3AHF is a newcomer to the hook-up for which Doug 3IJ was over at Peter's 3APF, he was going to confer with Chas 3ACW and Alan 3SQ regarding the possibility of holding the Annual Convention at Avenel. Noticed a reference to the activities of Murray's (3HZ)

XYL on the C.W.A. in the provincial news-sheet. Did not like to go in past Ale's 3AT brass plate just on social business the other day.

The North Eastern Zone's Convention will be held at the Avenel Hotel at 10 a.m. on Sunday, 8th March. See you at the Convention!

CENTRAL WESTERN ZONE

Being harvest in this neck of the woods, the zone has been fairly quiet but activity is again on the up and up. Main item of interest is the departure of Cecil 3YW from the zone. All were sorry to see Cec. leave for Warrnambool, however will look forward to hearing that cheery voice rupturing the ether from the new QTH 3DP has been quiet on the air, being engaged in a big building project. What cook Jim?

Merv 3AFO looking for something that will radiate on 80 mx in a small space without too much b.c.i. 3AHL made a surprise appearance in the zone hook-up recently. Has been relieving around VKZ, so also quiet on the air. The v.b.f. bug is again biting a little in the zone and 3RR has been having 8 mx contacts with 3ATN in Birchip. 3ATR made a flying visit to 3ATN's shack, returning home after working a VV5 and sabotaging Ray's D104. Byron 3TA heard occasionally on 20 mx also.

EASTERN ZONE

Not much activity in the zone this month with Hams away on holidays or just arriving home from same. 3SS, together with XYLs and Junior ops, has been enjoying a well earned holiday at Lakes Entrance. 3IZ and second op. John have been spending most of their time fishing these days. At least that's what they called it.

It is with regret that I record the loss of 3IZ from the zone. The powers that control Peter's "Job" (kid) whacking have decreed that he shall now reside at Maryborough. Peter has always been of great assistance in all matters connected with the zone, particularly emergency and mobile work. Peter's off-sider, John Batterick, and David Scott had another go for their tickets this month and are both beaming with confidence.

3DE is a regular on 3650 Kc. these days, nice work Doug, keep it up. 3QZ still as reliable as ever on the hook-up. 3JUN and 3JUN are working do without you, Graham. 3AIHK back on the air with a Q5 signal, he's got that modulator right at last, 3SG revamping a TA15, putting an 813 in the final so it should be the



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WESTERN AUSTRALIA

Did you hear the story about the Ham and the tower? Cruising about a strange suburb in his car, this gentleman, who was a windmill but was disappointed to find the occupants of the property absent. He made a note of the address and when he got home, wrote down a note asking if the Ham was for sale and if so, how much? Back came a courteous reply—"Dear Dave, sorry, it's not for sale, but it is wanted for the same purpose as you have in mind," and the epistle bore the name and call sign of another VK6. It was a little bit of a book with you when you go tower hunting!

OGA will be back at Forrest no doubt by the end of this year, and this time, as per Bill's plan, on holidays and enjoying some of Mum's home cooking back at the old Mars Street QTH. Heard you testing some 7 Mc. A-3 Bill at 445 mc. 12/23 and gave you a call on an otherwise dead band, but no dice.

Recent visitors to Geraldton included 6RL, 6RT and 6LB. Ralph and Leo have been relieving at what I would call (if it were not for a thing called plagiarism) the "best . . . etc. in W.A." 6RT has been transferred to Nungarin so at least graduates back again from batteries to 220 volt etc. This should give us quite a cosy little party. Mum and Dad are still comprising 6BS, 6CN, 6DW, 6MG and 6RT. There has been some short skip on twenty lately enabling me to hear 6RT and 6CN. Heard 6RT and 6CN still with the QRM and bad conditions to keep with the GAFF.

"And that is the end of the news"—or it would be, if it were not for some v.h.f. notes kindly supplied just in the nick of time by "of faithfulness." He reports that 50 Mc. opened VK6 in November and 6DLV moved back to ZL1 in December and January. The openings, with one or two exceptions, were not as strong as those of last year. VK6s predominated during these openings. Don 6HK is very pleased with himself over working VK7 and ZL. Jack 6GB has a new element beam going and is tickling with the 400 mc. on 815; reports say the team works well. Roger 6RK and Blake 6GS have gone over to f.m., but my spy says, "Just whether the f.m. will be better than a.m. has yet to be demonstrated." Ahem! No comment! (Except to say I'm glad they're using the 400 mc. band. I hope 6DLV will be at his new QTH, but has been around quite frequently as have 6TR and 6FC.

6DW went to Adelaide by car (I hope you kept away from the car, mister, or you'd be claiming to work for the "best . . ." (you know what) and worked back on 50 Mc. to several VK6s and 6DLV. Heard 6DLV and 6CN. I was told, has been assigned the call VK6SDV 50 Mc. had a good time. My spy heard the Eastern VK6s calling 6WR and 6LT but presumably did not log either Wally or Norm.

6MU is another heard and worked from Perth who had his share of the six metre DX while it lasted. 6BO snared his share of the Interstate QSOs. Role has been back at Bunbury with portable gear and has worked from there to the city with contacts with 6HK, 6GB and 6C. Bunbury has it that 6C is back on the band. Lou 6LU, however, has departed to other regions, notably 21 and 14 Mc.

A new call sign on 144 Mc. band belongs to Jim 6H. He has been working a 200 Mc. band from Boya. 6HK has also been heard 6GB's signals. On the 80 Mc. band, the 6H's have been heard. Those of 6DW and 6BO, the former checking his new converter with the latter.

As for 21 Mc., the despatches say the band has been busy on several occasions. Don 6DLV, when I'm listening I'm sorry to say, and ZSL, ZSS, ZKZ, VSI and VST have been worked. 6LU and 6H have also been heard. There are no doubt others too, but I have no other reports.

TASMANIA

The general meeting for February was held in the Photographic Society's Room on Thursday 8/2/53. Some 20 members and guests were present, a fairly representative gathering, including a most welcome northern visitor, Peter Frith, 7FP.

The most important function of the evening was the presentation of a life membership to Mr. Lon Jensen, VK7JL. Lon has been very closely associated with Amateur Radio in Tasmania for a very long time, and has always been a most energetic worker on its behalf. A Foundation Member of the old Hobart Radio Research Club, he later became allied with the Tasmanian Radio Club, and has played a greater part in W.I.A. affairs. Chiefly responsible for the post-war revival of the Tasmanian Division, he has also acted for some years in the past. Our congratulations and very best wishes go to you, Lon, and we hope your

interest in Amateur Radio will reign supreme for many, many years to come.

The latter part of the evening was admirably filled in with the screening of technical films by courtesy of the P.M.G.A. Dept. (Training School Section). Under the manipulation of Mr. D. Dannock, these sound films proved most interesting, and were greatly appreciated by all. During film change intervals, unheeded comedy was provided by visiting naval men, who, had they known, probably couldn't have cared less, as they were quite well paid, too, when you consider that their bottles had no filaments.

One of the most pleasing item of news is the acquisition of our own club room in Wellington House, Liverpool Street, Hobart. The room is quite commodious and does not require much wiring to it to bring it into line with our requirements. It should prove a great asset to the Hobart section.

In closing, members are advised that the new Advisory Council will be as follows: 7OM, 7LE, 7AL, 7RT, 7LJ, 7JD. Also that the Sunday morning 2 x 150 re-broadcast of 7WI has been discontinued until further notice.

Another addition to our ranks is Mr. W. H. Ion, of Beaconsfield, and we welcome him to associate membership. Also, congratulations to TDH on the arrival of another junior op. So far, my notion of what you were doing, I did not know that you had already adopted an approved and highly satisfactory method of diverting the XLV's attention away from Ham Radio, but what about the QRM? Snowy QTH is starting to weaken, guess the bug is picking the right places to bite, so it should be soon now. 7MG seems very weak, as has been heard on 40 mc. Also heard Don TDC putting a very nice signal down this way.

Well, chaps, that's it. I have a feeling that "yours truly" will not be compiling the notes for next month, so when you find out who the next next—or, sorry, sorry, I don't forget that any items of news are always welcome.

NORTHERN TASMANIAN ZONE

Congratulations go out to F.E. on the T.V.I. Book which was made available to W.I.A. members.

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FOR SALE—Type 3 Mk. 11, new condition, complete, £35. R. Higginbotham, 43 Eleanor St., Ashburton, S.E.11, Vic.

SELL—Converter, plug-in coils, 20, 40 metres, bandspread, EF50, 6AC7, 6J5GT, £7/10/-; Battery Charger, 2, 4, 6 volts ½ amp., £1/10/-; 30 Henry 150 Ma. Choke, £1; Transmitter T1083, 2 coils and 2 new VT25 valves (6v. triodes), £1. K. Bridger, 132 Nott St., Port Melbourne.

SELL—Eddystone S640 Receiver, perfect, £45. New boxed meters, 0-5 and 0-100 Ma., 2" square mounting, 17/6. Crystals, FT243 holders: 3.511, 14120, .185, .190, .195, 7174, 7194, 7196, 7273, 20/-; 500 Kc. sub-standard in 2-pin (3") holders, 30/-; 2994, 2290, 6033, 6741, 7450, 7500 Kc., 7/6. New boxed valves: 829B 90/-, 832A 45/-, 834 and 8012 15/-, 809 40/-, 807 15/-, 1625 10/-, 636 14/-, 6C4, 6AK5, 5U4G, 83, 83V 12/-, Tested valves at 3/-: 6AR12, 6AL5, 6V56 (6X7) 7193, 6G8, 6SH7, VR136, 95A, 6A7, 6P7, 6BG, 6A8G, 6J8G, 6C6, 6E5, 7/-; 6N7G, 6AC7, 6J7, 6C3, 2A3, EF50, EF54, 6L7, 6X5, 955, 9003, LR18, 6J5, 12SR7, 12A6, 12SK7. SCR522 Tx section complete with tubes, £11. 1100-0-1100 250 Ma. trans., 70/-; New Eddystone split stat Tx cond., heavy silver plated 50 + 50, 65/-; Ditto Cylind. 15 + 15, 40/-; Gene. 12v. in, 350v. 250 Ma. out, £2. MCRI with power supply and

bers. Let's hope all zone members procured a copy as it's certainly f.b. and if these notes appear to be too short it is because yours truly is having a good "dekker" at it. TRK must qualify as the busiest Ham in VK. In recent months the busiest Ham has been painted, work attended to and immense concrete building done and yet Ray found time for the DX notes. 7CM gave radio away for a time and went holidaying on the East Coast. 7AM is still interested in motor racing and will be active in the field of radio transfer to the TFF on the recent announcement of his engagement. 7AB recently visited this area and tells us that he is planning to transfer to the under way. 7LZ has been quiet but still looking out, with 7BQ, for those elusive Interstate v.h.f. contacts. 7H, however, still sticks to the m.p. phone. That's all for now, must get back to the T.V.I. Book.

CORRESPONDENCE

A.N.A.R.E.,
Macquarie Island,
6th January, 1953.

Editor "A.R." Dear Sir,
Greetings from Macquarie Island! I would like you to bring to notice that this year's party will be held in the month of April, and so we will be late in forwarding QSL cards. I cannot see myself dealing with these before May and it may be June before they are delivered. Please be patient and I shall be looking for my card in April as was promised.

Also to those VKs who have made our stay here pleasant through their wealth of news and gossip, I'm sorry I have had to dash away so suddenly in the middle of a good QSO, but our Hamming is done between main sheds, and as these are of great importance, cannot be made waiting forward to seeing you all from VK6SR later in the year, 7B to all.

—ROB S. GURR, VK1RG.

phones, perfect, £6. Power supply, 400v. 250 Ma., fully filtered, sep. rect. trans., £6. Speaker trans, various inputs, 4/-; Many other parts. Call Saturdays or write McTaggart, 4 Kenilworth Grove, Glen Iris, S.E.6, Vic.

SELL—Garrard Record Changer RC30; 5 valve Bc Radio A.W.A.; 6 volt 125 ohm battery; S84 Edystone Gen. Receiver; Kingale 59'er and 6 Metre Converter; A.W.A. Signal Generator, Model C1070; 500 volt Megger; three Rola G12 Dynamic Speakers; 3 1/4" Advance Lathe, chucks, cutting tool set; 8" heavy duty Waldow Bench Grinder; partly completed Ham Shack, 16' x 12'; and unused building material. What offers? L. Sykes, 6 Somme Pde, Edithvale, Victoria.

SELL—100w. rack built Phone Tx, V.F.O., 60w. Mod. £70; 3" Oscilloscope, 3AP1, £30; AR301A, suit 2 metres, £9; 12 volt "R. & H." Car Radio, £25; Rola 12R and Ferguson OP4 Trans. to match, £12; 813, 809s, £2 each; copies "R. & H." "Radio World." What offers? I Henry St., Box Hill, Vic. (WX 6782).

SELL—40 and 80 Metre 3 Stage Transmitter, 6V6, crystal osc. 6F6 dblr., 1625 PA., band switched, v.f.o. crystal, complete, including metal cabinet, 27 watt Power supply for about £3. 25 watt Modulator, 807s in AB1, pre-amp., etc., £7. Power supply for Modulator, £3. L. B. Fisher (Hawthorn 2905).

WANTED—Auto Transformer. E. Blackmore, P.O. Kerang, Vic.

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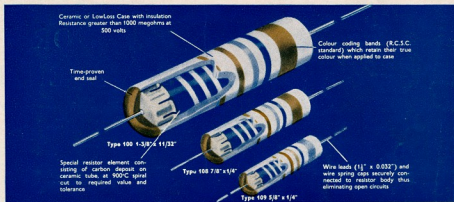
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COLOUR CODE

In the standardised system of colour coding the colours are read from the end of the resistor adjacent to the colour bands. The third colour always indicates the number of "noughts" following the first two numerals. The colour code is as follows:—

Black ... 0	Green ... 5
Brown ... 1	Blue ... 6
Red ... 2	Violet ... 7
Orange ... 3	Grey ... 8
Yellow ... 4	White ... 9

If a fourth band is added on resistors, it indicates the tolerance according to the following code:—

Gold, $\pm 5\%$ tolerance;
Silver, $\pm 10\%$ tolerance.

If the fourth metallic indication is absent, the tolerance is assumed to be 20%.

Examples:

1. Red, Violet, Orange, Silver—27,000 ohms $\pm 10\%$.
2. Yellow, Violet, Black, Gold—47 ohms $\pm 5\%$.
3. Blue, Grey, Brown—680 ohms $\pm 20\%$.

INTERNATIONAL PREFERRED VALUES (10% Tolerance)

The following table lists the standard resistor values in ohms, comprising the 10% Tolerance Range. Each resistor covers values within $\pm 10\%$ of its nominal value.

Pre. V. Res. Range	Pref. Val. Res. Range	Pref. Value Res. Range	Pref. Value Res. Range
10 — 10-11	330 — 297-363	10,000 — 9,000-11,000	330,000 — 297,000-363,000
12 — 11-13	390 — 351-429	12,000 — 10,800-13,200	390,000 — 351,000-429,000
15 — 14-16	470 — 423-517	15,000 — 13,500-16,500	470,000 — 423,000-517,000
18 — 17-19	560 — 504-616	18,000 — 16,200-19,800	560,000 — 504,000-616,000
22 — 20-24	680 — 612-748	22,000 — 19,800-24,200	680,000 — 612,000-748,000
27 — 25-30	820 — 738-902	27,000 — 24,300-29,700	820,000 — 738,000-902,000
33 — 30-36	1,000 — 900-1,100	33,000 — 29,700-36,300	1,0 meg. — 0.9-1.1 meg.
39 — 36-42	1,200 — 1,080-1,320	39,000 — 35,100-42,900	1.2 meg. — 1.08-1.32 meg.
47 — 43-51	1,500 — 1,350-1,650	47,000 — 42,300-51,700	1.5 meg. — 1.35-1.65 meg.
56 — 52-61	1,800 — 1,620-1,980	56,000 — 50,400-61,600	1.8 meg. — 1.62-1.98 meg.
68 — 62-74	2,200 — 1,980-2,420	68,000 — 61,200-74,800	2.2 meg. — 1.98-2.42 meg.
82 — 74-90	2,700 — 2,430-2,970	82,000 — 73,800-90,200	2.7 meg. — 2.43-2.97 meg.
100 — 90-110	3,300 — 2,970-3,830	100,000 — 90,000-110,000	3.3 meg. — 2.97-3.83 meg.
120 — 108-132	3,900 — 3,510-4,290	120,000 — 108,000-132,000	3.9 meg. — 3.51-4.29 meg.
150 — 135-165	4,700 — 4,230-5,170	150,000 — 135,000-165,000	4.7 meg. — 4.23-5.17 meg.
180 — 162-198	5,600 — 5,040-6,160	180,000 — 162,000-198,000	5.6 meg. — 5.04-6.16 meg.
220 — 198-242	6,800 — 6,120-7,480	220,000 — 198,000-242,000	6.8 meg. — 6.12-7.48 meg.
270 — 243-297	8,200 — 7,380-9,020	270,000 — 243,000-297,000	8.2 meg. — 7.38-9.02 meg.

INTERNATIONAL PREFERRED VALUES (20% Tolerance)

Pre. V. Res. Range	Pref. Val. Res. Range	Pref. Value Res. Range	Pref. Value Res. Range
10 — 10-12	330 — 264-396	10,000 — 8,000-12,000	470,000 — 376,000-564,000
15 — 12-18	470 — 376-564	15,000 — 12,000-18,000	680,000 — 544,000-816,000
22 — 18-26	680 — 544-820	22,000 — 17,600-26,400	1.0 meg. — 0.80-1.20 meg.
33 — 27-39	1,000 — 800-1,200	33,000 — 26,400-39,600	1.5 meg. — 1.20-1.80 meg.
47 — 38-56	1,500 — 1,200-1,800	47,000 — 37,600-56,400	2.2 meg. — 1.76-2.64 meg.
68 — 55-81	2,200 — 1,760-2,640	68,000 — 54,400-81,600	3.3 meg. — 2.64-3.96 meg.
100 — 80-120	3,300 — 2,640-3,960	100,000 — 80,000-120,000	4.7 meg. — 3.76-5.64 meg.
150 — 120-180	4,700 — 3,760-5,640	150,000 — 120,000-180,000	6.8 meg. — 5.44-8.16 meg.
220 — 178-264	6,800 — 5,440-8,160	220,000 — 176,000-264,000	10.0 meg. — 8.00-10.0 meg.

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